DIRECT TESTIMONY

OF

ANDREW R. WALKER

ON BEHALF OF

DOMINION ENERGY SOUTH CAROLINA, INC.

DOCKET NO. 2021-93-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION WITH DOMINION ENERGY SOUTH CAROLINA, INC. ("DESC" OR "COMPANY").

A. My name is Andrew R. Walker and my business address is 220 Operation Way, Cayce, South Carolina 29033. I am employed by DESC as Consulting Engineer, Power Generation Operations.

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR BUSINESS EXPERIENCE.

A. I graduated cum laude from Clemson University in December 2009 with a Bachelor of Science degree in Mechanical Engineering and earned a Master of Public Administration from the University of South Carolina in May of 2012. I began my career with DESC, then South Carolina Electric & Gas Company ("SCE&G"), in February 2010 at the Company's Wateree Station as the facility's Operations Engineer. In January 2016, I was promoted to the position of Supervisor, Air Quality Controls where I managed a team of engineers across the Company's A.M. Williams, Wateree, and Cope coal-fired power generation stations with responsibilities for oversight of the operation and maintenance of the air pollution control equipment at those facilities. In August 2019, I transitioned into a developmental role reporting to the Director of Power Generation Operations with an array of responsibilities including new generation project development, interfacing with the Company's Resource Planning group, representing Power Generation in merger integration and benchmarking activities with our sister utility's operations in Virginia, and managing the Company's relationship with the Electric Power Research Institute ("EPRI"). In January 2021, following the conclusion of merger integration activities, I assumed my current position as Consulting Engineer, Power Generation Operations.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION PREVIOUSLY?

A. No, I have not.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to explain the Company's plan to retire thirteen end-of-life and increasingly difficult to maintain simple-cycle combustion turbines and one associated natural gas-fired steam unit and replace them with five new aeroderivative simple-cycle combustion turbines (the "CT Replacement Plan"). The Company is prepared to replace ten of the retired combustion turbines and the one associated gas-fired steam unit with five modern aeroderivative combustion turbines (the "Replacement Units") that will be located at the same three sites where the units that they are replacing are currently located. The Replacement Units will provide the same critical reliability functions to the electrical system as the units that they are replacing, but with greater reliability, efficiency and operational flexibility and with lower fuel costs, maintenance requirements and air emissions. The Replacement Units will use the existing electric transmission interconnections, gas supply infrastructure, alternative fuel storage facilities, and site management and security resources that support the units that they are replacing. The remaining three combustion turbines at two sites will be retired without replacement.

THE NATURE OF THE REQUEST AND THE RFP

Q. WHAT IS THE REQUEST BEFORE THE COMMISSION IN THIS PROCEEDING?

A. The Company's primary request is that the Commission issue a ruling recognizing that none of the Replacement Units require the issuance of a certificate of public convenience and necessity (a "Certificate") under the Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 et seq., (the "Siting Act"). The Replacement Units envisioned at

Parr Station and Bushy Park/A. M. Williams Station are less than 75 megawatts in capacity. As such, the Company has concluded that they are not major utility facilities requiring a Certificate or a like facility determination from the Commission. In addition, all five Replacement Units serve a similar function and purpose and do so at the same location as the units they replace. The Company has determined that under Section 110 of the Siting Act, such like facility replacements should not require a Certificate and is respectfully requesting the Commission to enter an order recognizing that to be the case.

Q. ON WHAT SPECIFIC BASIS DID THE COMPANY DETERMINE THAT IT SHOULD BE ABLE TO PROCEED WITH THE URQUHART UNIT REPLACEMENTS AS LIKE FACILITY REPLACEMENTS?

A. The Company based its determination to request a like facilities determination related to the Urquhart replacements on its analysis of the facts supporting such determinations in prior Commission proceedings. In prior proceedings, the Commission has recognized that the like facility requirement under Section 110 of the Siting Act is met where "replacement facilities are similar in function and purpose to the presently existing facilities," even if the new facilities increased the capacity or fundamentally changed the configuration of the facilities that they were replacing. *See*, Commission Order No. 2014-963 at page 2. Duke Energy Carolina's repowering of a three-unit coal plant to burn only natural gas and the associated construction of new gas infrastructure at the site was determined by the Commission to be a like-facilities replacement not requiring a certificate. *See*, Order No. 2014-118; Order No. 2021-438 (replacing an existing transmission line with steel structures and higher capacity lines while adding a new substation was a like facility replacement); Order No. 2018-33 (same); Order No. 2014-633 (same). These orders are an important part of the basis on which the Company decided to file for a like facility determination related to the Urquhart replacements.

Q. IS THE LIKE FACILITY DETERMINATION THE ONLY REQUEST BEFORE THE COMMISSION?

A. No. The Company is also asking the Commission to acknowledge that under Order No. 2007-626 and Order No. 2018-804 the Company is not required to conduct an RFP process for the Replacement Units because they do not represent capacity being added to the system to satisfy "new peaking generation requirements" as specified by those orders. In reaching that conclusion, the Company relied on Order No. 2007-626 which provides that "RFPs will ***only*** be mandatory for ***new*** peaking generation requirements." *See,* Order No. 2007-626 at page 2 (emphasis supplied). Similarly, Order No. 2018-804 recognized a settlement requiring an RFP only for "a ***new*** generating resource." *See*, Order No. 2018-804 at p. 32 (emphasis supplied). The purpose of this CT Replacement Plan is to meet existing generation requirements with similar units that are more reliable, more efficient and more capable than the ones that are currently meeting those requirements. Therefore, the Company determined that the Replacement Units are not units being planned to meet "new peaking generation requirements" and so do not fall within the RFP requirements. In reaching its decision to make this request, the Company also relied on Commission Order No. 2008-469 at pages 4-5, in which the Commission waived the mandatory RFP requirement for the replacement of four aging turbines at the Company's Burton and Faber Place substations with a combined summer capacity of 38 MW with two relatively new turbines at Hagood Station with a combined summer capacity of 34 MW as a "beneficial, cost effective and fuel-efficient proposal that is consistent with the considerations that led this Commission to issue the RFP Order."

Q. IS DESC ALSO ISSUING AN RFP FOR COMBUSTION TURBINE REPLACEMENT RESOURCES IN PARALLEL WITH THIS PROCEEDING?

A. Yes. The Company is preparing a new, technology-neutral, all source RFP for alternative assets that can meet the system need being met by the functionally obsolete combustion turbines that the Company intends to replace. Ideally, the Company would have only issued such an RFP if at the end of this proceeding the Commission had determined one was in fact necessary. But, the procedural schedule as it has developed in this proceeding did not support that approach. The Company seeks to avoid the delay that would result from waiting until this proceeding is concluded to start the RFP process, if it were so ordered by this Commission.

Q. WHY IS AVOIDING THAT DELAY IMPORTANT?

A. As I will discuss in more detail later in my testimony, the existing combustion turbines are units at the end of their operational lives. In their current condition they are not suitable for intra-day peaking and load following use as the system requires. That is an important limitation given the high level of intermittent solar generation on the DESC system today and the need for combustion turbines that are in a condition that allows them to be used to respond to that intermittency. Because of their age, these existing units are also relatively fuel-inefficient, are increasingly difficult to maintain and repair, and continuing to operate them indefinitely poses a very real reliability risk. Three of these units are currently out of service due to equipment failures or other issues. Returning these units to service would require expensive repairs that would be wasteful to complete given the units' overall general condition and vintage.

These thirteen combustion turbines (267 MW) represent approximately two-thirds of the simple-cycle combustion turbine capacity on DESC's system today. Despite their limitations, the existing units play a very important role in day-to-day system operations and reliability. But, given their age and condition, their ability to play that role is limited and is not sustainable. For that reason, it is important that the replacement of these units not be further delayed.

Q. PLEASE EXPLAIN HOW THE AGE, DESIGN AND CONDITION OF THESE UNITS IS LIMITING THEIR USE FOR INTRA-DAY PEAKING AND LOAD FOLLOWING.

A. These are late-sixties vintage units that were designed for infrequent or seasonal use during extreme weather peaks or during times of significant capacity shortfalls. Beyond that, they were intended for standby service as off-line, quick-start reserves and to provide voltage support and black start capabilities. They were designed for intra-day use, but not intra-day use on a sustained, day-in and day-out basis. These units continue to perform those services even though their age and condition have resulted in increasing maintenance and reliability issues. But their continued service, even in this limited capacity, is not sustainable long term.

Ideally, DESC's system controllers would be able to call on these units routinely to meet the short duration intra-day needs that the system is now experiencing due to solar intermittency and as a result of solar resources displacing traditional, dispatchable generation resources that now can be off line more often because they are not required to meet load during daylight hours. Optimally meeting current intra-day needs would involve starting combustion turbines on a regular, even daily, basis and running them for periods as short as an hour or two at time to meet intra-day peak demands and to respond to solar intermittency as weather and cloud cover change solar generation levels hour by hour. In theory, the existing combustion turbines can be used in this way, but their age, design and condition does not allow them to be brought on and off line so regularly without jeopardizing their availability and value to the system for reserves and ancillary services, including black start capability. In their age and condition, they simply cannot be reasonably expected to withstand the additional wear and tear. Instead, other less efficient unit commitment decisions must be made to meet these intra-day needs. This increases customer fuel costs and air emissions.

Q. WHAT HAS BEEN DONE TO PLAN FOR THE REPLACEMENT OF THESE COMBUSTION TURBINES?

A. In preparing the CT Replacement Plan, DESC identified aeroderivative combustion turbines as the appropriate technology for the Replacement Units. These units have a unique combination of fast start-times, short minimum run-times, the ability to support multiple starts and stops per day, high reliability, relatively low capital cost, flexible operations, black start capability, fuel efficiency, and non-energy limited, dual fuel capacity. Having identified aeroderivative units as the appropriate technology, DESC then took steps to determine what costs would be involved in acquiring replacement units and the schedules for installing them. To that end, DESC issued an RFP to determine which manufacturer's units to purchase at what cost, and which contractors to install them and at what cost. The Turbine Supply Agreement RFP was conducted in late 2020 and early 2021 and the Engineering, Procurement, and Construction RFP was conducted in mid-2021. Bidders have provided their responses and major contracts have been negotiated and are ready to execute, subject to the authorization requested in this proceeding. All this was done with the clear understanding that these were like facility units which can be replaced without a new Siting Act Certificate.

Q. WHO BID TO SUPPLY THESE UNITS AND WHO WAS SELECTED?

A. The Company issued a Turbine Supply Agreement RFP to the three leading combustion turbine vendors, General Electric International ("GE"), Mitsubishi Power, and Siemens Energy. Based on competitive bids received from these leading suppliers, DESC has chosen GE technology for the Replacement Units. GE is the global leading producer of aeroderivative generating units and is known for its quality and service. The equally well qualified firm of Burns & McDonnell has been selected for Engineering, Procurement and Construction services following a competitive RFP process.

Q. WHY ARE THESE UNITS REFERRED TO AS "AERODERIVATIVE" UNITS?

A. The combustion turbine used in aeroderivative electric generation technology is based on jet aircraft engine design. In the case of the units selected here, the turbines are built alongside jet engines in a GE jet engine factory. When used for electric generation, the aeroderivative turbine is fixed in place and provides shaft horsepower to a generator set which produces electricity.

A conceptual rendering of a GE LM6000 unit, as the Company proposes for the Bushy Park and Parr sites, showing the aeroderivative combustion turbine component in cutaway is below:

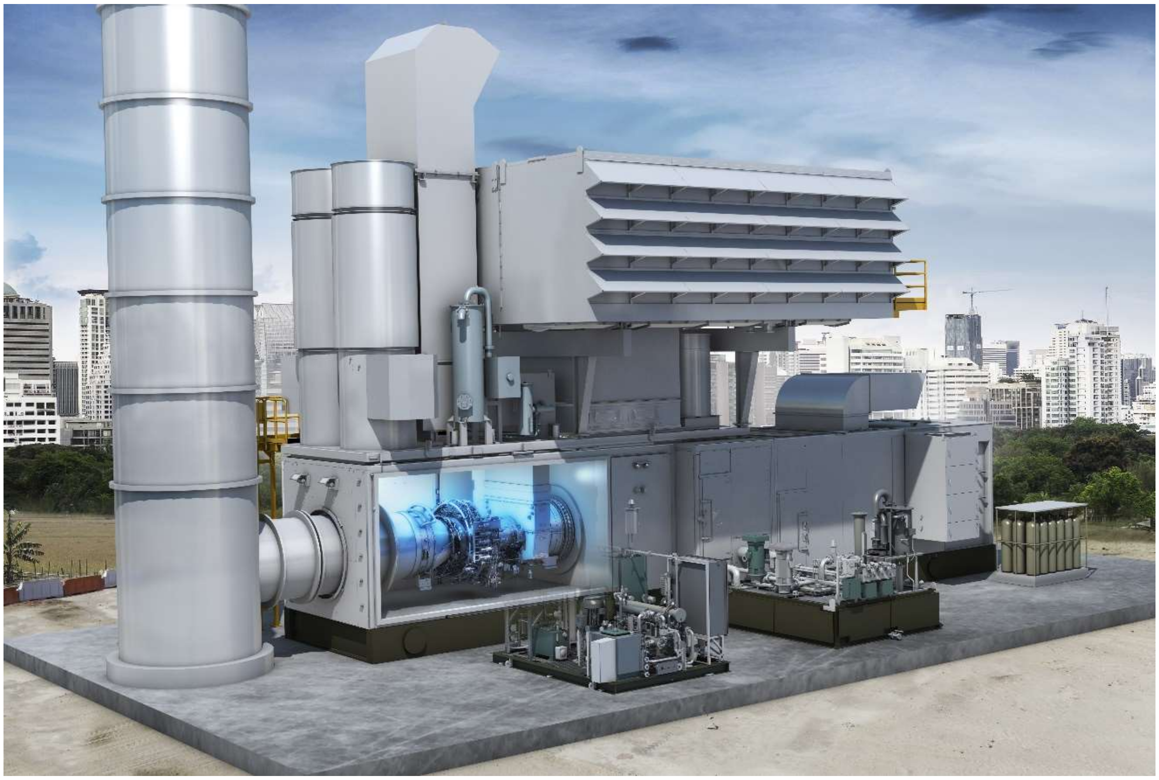

Figure 2 – GE LM6000 PF+ (With Cutaway Showing the Aeroderivative Combustion Turbine Section of Unit)

Q. WHY ARE AERODERIVATIVE UNITS SUITABLE FOR USE IN THIS CONTEXT?

A. Jet aircraft engines are inherently designed for flexible and reliable operations with multiple fast starts per day, high fuel efficiency, and standardized maintenance and repairs. For these reasons, aeroderivative technology is well suited for use in replacing the Company's existing combustion turbines.

Q. WHAT IS THE SCHEDULE FOR THE REPLACEMENTS?

A. The winning bids provide for the manufacture, delivery, and installation of the Replacement Units at favorable prices and on a schedule that allows the units to come online between 2023 and 2025, provided that timely regulatory approval as sought by the Company in this docket. However, the vendors can withdraw those price and schedule commitments if DESC does not proceed to contract due to continued procedural delays in this docket.

Q. WHY IS IT IMPORTANT NOT TO LOSE THESE PRICE AND SCHEDULE COMMITMENTS?

A. The Replacement Units are long lead-time items. If the current bids are allowed to lapse, global supply chain issues, inflationary pressures, and disruptions throughout the manufacturing and energy economy could delay the project and increase costs. Specifically, losing the current schedule commitments could put the project at the back of the manufacturing queue and could result in price increases and potentially lengthy schedule delays. Other utilities, both in the United States and internationally, are constructing similar aeroderivative units in response to the growth of intermittent renewable energy sources. Relinquishing its negotiated position in the turbine-generator equipment manufacturing queue would have a significant delay impact to the proposed schedule.

Q. HOW WILL THE COMPANY PROCEED IF THE NEW ALL SOURCE RFP RESULTS IN A CHANGE IN THE REPLACEMENT PLAN?

A. It is highly unlikely, but possible, that the new all source RFP responses will identify a new approach or set of resources that are more beneficial than the current Replacement Plan. The Company does not anticipate that will be the case. But, if so, the Company will file an amended request for a like facility determination for the new approach or, if necessary, for a full Siting Act certification before proceeding. Granting the present request will in no way foreclose a different path if the RFP shows that doing so is in customers' best interest. But, by granting the present request, the Commission will allow the Company to proceed with the project and perhaps protect its current price and schedule commitments in the likely event that the RFP does not produce a better alternative than the current plan. For these reasons, the Company has determined that it is in customers' interest that the consideration of this request not be delayed until completion of the RFP.

Q. WHAT ROLE WILL A THIRD PARTY EVALUATOR AND STAKEHOLDERS HAVE IN PREPARING THE RFP?

A. The Company is retaining Guidehouse Consulting to serve as an experienced advisor and independent evaluator for the new all source RFP process. As of October 2021, the Company was finalizing a statement of the technology-neutral technical requirements and schedule for the RFP which it intends to share with key stakeholders for review and comment before releasing the RFP. The Company anticipates releasing the RFP to bidders in November 2021.

Q. HOW LIKELY IS IT THAT THE NEW ALL SOURCE RFP WILL RESULT IN A CHANGE IN THE REPLACEMENT PLAN?

A. The Company has extensive knowledge of the electric generation technologies available today and is not aware of any technology or combination of technologies that can provide the same benefit to the system as combustion turbine units, nor are there projects that the Company is aware of that are being developed in its service territory that can provide the same services as the existing combustion turbines. An important factor here is that both voltage support and black start functions are key capabilities to be replaced. Both are highly localized services that will require resources to be physically located in those parts of DESC's system that those resources will support. Nonetheless, the Company will test for alternatives through the technology-neutral set of requirements it will put into the market. If that all source RFP identifies a superior alternative, then the Company will bring that alternative before the Commission on an expedited timetable.

THE NEED FOR COMBUSTION TURBINE CAPACITY TO SUPPORT GRID RELIABILITY AND EFFICIENCY

Q. WHAT IS THE FUNCTION OF COMBUSTION TURBINES ON THE COMPANY'S SYSTEM?

A. The Company relies on Combustion Turbines to allow it to do multiple things that are necessary to operate the grid reliably and efficiently. The Company uses combustion turbines to:

1. Meet customer demands as they fluctuate moment by moment,
2. Respond in real time to the intermittency of renewables and the unanticipated loss of traditional generation or transmission resources,
3. Ensure capacity is available to meet extreme winter and summer peaks and cover planned generation outages during shoulder months,
4. Provide sufficient capacity for the Company to meet its contingency reserve obligations under the Virginia Carolinas ("VACAR") Reserve Sharing Arrangement and North American Electric Reliability Corporation ("NERC") approved planning and operating criteria,
5. Meet customers' energy needs at reasonable cost (fuel efficiency),

6. Have the ability to restart the system or isolated parts of it in case of blackout (black start),
7. Maintain voltages within established parameters throughout all parts of its system at all times (voltage support), and
8. Provide backup power for nuclear safety purposes.

Combustion turbines are critically important in allowing DESC's generation system to do these things safely, reliably, and economically. No other resource has the same mix of capabilities and operating benefits as do simple-cycle combustion turbines.

Q. WHY ARE COMBUSTION TURBINES IMPORTANT TO ITEMS 1 AND 2, SPECIFICALLY, IN RESPONDING TO CHANGING CUSTOMER DEMANDS, THE INTERMITTENCY OF RENEWABLES, AND THE UNANTICIPATED LOSS OF TRADITIONAL GENERATION OR TRANSMISSION RESOURCES?

A. As fast-start units, the combustion turbines can go from off-line to fully loaded in ten minutes or less. For that reason, they are a primary tool that can be used by grid operators to respond to unanticipated changes in customers' load, unscheduled changes in the output of major generation facilities or availability of transmission lines and solar intermittency. Because of their quick response time, combustion turbines are critical to managing grid reliability with the large quantity of intermittent solar resources that have been added and are being added to the DESC system.

Q. WHY ARE COMBUSTION TURBINES IMPORTANT IN ENSURING CAPACITY IS AVAILABLE TO MEET EXTREME WINTER AND SUMMER PEAKS AND TO COVER PLANNED GENERATION OUTAGES DURING SHOULDER MONTHS (ITEM 3)?

A. Combustion turbines are dispatchable, non-energy limited generation assets that can be installed and maintained on the system at a low capital cost to customers relative to larger base load units. Compared to alternatives, these units reduce the capital cost per kilowatt (kW) of the generation system as a whole.

As a result, combustion turbines economically supply reserves to meet customers' winter or summer peak demands, to respond to system emergencies, or to support loads when other generation assets are out of service for scheduled maintenance. Combustion turbines' low capital costs compared to base load resources like combined cycle units more than offset the higher fuel cost of operating them during the relatively few hours a year when their capacity is needed to meet peak loads, respond to unexpected losses of generation capacity or other system emergencies, or provide intra-day balancing. Investing in more fuel efficient but higher cost assets to meet reserve requirements and time-limited demands would increase costs to customers.

Q. WHY ARE COMBUSTION TURBINES IMPORTANT IN ENSURING THAT THE COMPANY HAS SUFFICIENT CAPACITY TO MEET ITS RESERVE OBLIGATIONS UNDER VACAR AND NERC APPROVED PLANNING CRITERIA (ITEM 4)?

A. Because their start times are ten minutes or less, combustion turbine capacity can count towards contingency reserves, even when the units themselves are off-line. This is highly efficient because there are no fuel cost or air emissions associated with meeting reserve requirements using off-line combustion turbines.

Equally importantly, having combustion turbines on the system as available reserves means other more fuel-efficient units, like combined cycle units, battery storage units (once available), pumped storage units, or hydro units, do not have to be held back as reserves but can be used optimally to generate low-cost energy to meet customers' demands.

Q. PLEASE EXPLAIN IN MORE DETAIL HOW, AS RESERVES, COMBUSTION TURBINES MAKE THE SYSTEM MORE FUEL EFFICIENT (Item 5)?

A. Without combustion turbines available to serve as reserves, other units, including more fuel-efficient units, would have to be kept in reserve or kept on line, but only partially loaded, so that they could be ramped up to provide capacity to meet unanticipated changes in customer demands or system emergencies, such as the forced outage of a large generating resource. Utilizing combustion turbines to provide these reserves makes it possible for the Company to optimize the use of its combined cycle units, battery storage and pumped storage units, or hydro units, day in and day out. The availability of sufficient combustion turbine capacity as reserves allows the Company to operate its other units at optimal loads, increasing fuel efficiency, and reducing fuel costs and air emissions. Over time, this reduces fuel costs paid by customers compared to the costs that would be incurred if more fuel-efficient units were held in reserve.

Q. PLEASE EXPLAIN HOW COMBUSTION TURBINES SUPPORT THE EFFICIENT AND ECONOMICAL USE OF PUMPED STORAGE AND WILL SUPPORT FUTURE ECONOMICAL USE OF BATTERY STORAGE ASSETS?

A. Storage assets, whether pumped storage or battery storage, are energy limited resources that are best used on a daily cycle to store electricity during times of low energy cost and low system demand and return that electricity to the system when demands and costs are high. They can be cycled to capture and arbitrage energy value daily, or be held in reserve, but not both. So, to count battery storage assets as contingency reserves would require that the batteries be kept charged at all times so that energy would be available in case of an unexpected need or system emergency. Cycling could not be permitted.

For this reason, using storage assets for contingency reserves would be a waste of the value that they represent to the system and would be uneconomical, particularly given the relatively high cost of battery storage at present. For this reason, battery storage is not an economical replacement for combustion turbines. On the other hand, keeping sufficient combustion turbine capacity on the system allows energy-limited pumped storage and battery storage assets to be used to their full potential taking advantage of daily demand cycles, solar profiles and other factors.

Q. HOW DO COMBUSTION TURBINES SUPPORT RELIABILITY THROUGH BLACK START CAPABILITY (ITEM 6)?

A. Combustion turbines provide black start capability which is the ability to restart the electric transmission and distribution system, or portions of that system, when they lose power and must be restored and resynchronized to the grid. This can occur immediately following a cascading generation outage or a loss of load event due to extreme winter weather or following a hurricane or tornadic activity, for example.

There are only a limited group of on-system resources can perform this black start function. Hydro generation resources are one, but there is limited hydro capacity on the DESC system and it is concentrated in the Columbia-area; adding new hydro capacity is not feasible. Pumped storage can serve this function, but it is energy-limited, and its usefulness for black start will depend on the amount of water available in the upper (storage) reservoir at the time of system restoration.

Battery storage has some potential in this regard, but, like pumped storage, it is also energy-limited. No grid operator has perfect foresight into when a black start event may occur or how long it may last. Major blackout events in the United States that have required black start resources lasted far longer than the typical four-hour energy duration of nascent battery storage technology that is currently being deployed at utility-scale. These would include the Northeast Blackouts of 1965, 1977, and 2003. While the recent events in the State of Texas did not require the utilization of black start resources, grid operators in that state have attested that their system came perilously close to collapse and needing black start. The winter storm event that precipitated the events in Texas lasted for several days, well in excess of the typical energy duration of utility-scale storage assets like pumped or compressed air energy storage and batteries.

To use battery storage resources for black start would mean not using it on a daily basis to store and return energy to the system, which is its highest and best use. Holding fully-charged battery storage in reserve at all times for use as black start capacity would be wasteful and cost prohibitive. Combustion turbines are not energy-limited, making them ideal for black start purposes. Because DESC's combustion turbines have alternative fuel on site, they can operate without natural gas pipeline capacity for 72 hours, and fuel reserves can be replenished during that time if necessary.

Q. CAN BLACK START CAPABILITY BE EFFECTIVELY PROVIDED USING OFF-SYSTEM RESOURCES?

A. Absent exceptional circumstances, no. Black start requirements are location specific. Black start involves restoring power to a specific section of the transmission system while that section remains isolated from the grid. Once basic service is restored to that section of the system, then it can be synchronized to the grid and reconnected to grid at large. For this to happen, the black start units must be physically located at a place where they can be directly connected to the part of the system being initially restored to service and to restore station service power to traditional thermal generation resources like nuclear and combined cycle facilities. In addition, the black start units must be under the direct operational control of DESC's system controllers to support the intense coordination required with transmission and distribution operations as circuits are re-energized and cold loads come back on-line. For these reasons, black start is one of the services that cannot be provided by off-system resources even if long-term, firm transmission capacity is available, which often it is not.

Q. HOW DO COMBUSTION TURBINES SUPPORT RELIABILITY THROUGH VOLTAGE SUPPORT (ITEM 7)?

A. Combustion turbines are well suited to provide voltage support and regulation in the areas where they are located. They can do so on short notice and without the need to disrupt other unit commitment planning. Reactive power or VARs (VARs – volt-amp reactive) is the reactive electrical property in alternating current (AC) utility transmission and distribution systems. VARs are critical to the efficient and reliable operation of the system and to providing a robust and stable delivery voltage. Some end-use equipment, like induction motors, consume VARs which must be replaced on that specific part of the system where they are being consumed for voltage to be maintained. Unlike inverter-based generation, combustion turbines inherently have a significant amount of rotational inertia that provides a robust supply of VARs and stability during system faults.

Q. DO CURRENT DESIGNS OF COMBUSTION TURBINES HAVE ENHANCED ABILITY TO PROVIDE VARS AND VOLTAGE?

A. Yes. The generators on modern combustion turbines can be configured to serve as synchronous condensers for system voltage control. A synchronous condenser is a grid device that operates synchronously with the grid specifically to support system voltage and stability. Through modulating the generator's excitation controls, a condenser can import or export reactive power. (Excitation controls determine the VAR output of the unit.) Synchronous condensers can provide or consume reactive power even when the unit is not otherwise generating electricity for the grid and require no fuel consumption when operating in this mode.

Synchronous condensers provide exceptionally high-quality voltage control as they respond instantaneously to system fluctuations and have rotating mass, which provides inertia to the system. Given that inverter-based generators do not supply inertia, synchronous condensers will likely be an increasingly critical component for maintaining reliability as more inverter-based renewable generation is added to the DESC system and as traditional thermal generation resources, like coal, are retired.

Q. HOW DO COMBUSTION TURBINES SUPPORT NUCLEAR SAFETY (ITEM 8)?

A. Two sets of combustion turbines, those at Parr and Urquhart, are connected by direct transmission circuits to V.C. Summer Unit No. 1 and the Savannah River Site, respectively. These units provide a reliable source of power to support nuclear safety-functions in case of grid failure.

In a black start scenario, the number one priority of DESC System Control is to establish dedicated 115 KV and 230 KV electricity pathways to

V.C. Summer Unit 1 to support critical loads, including reactor safety systems and core cooling. These dedicated pathways then allow system controllers to begin "rebuilding" the grid using other resources. Once the wider system is stabilized, the resources serving the nuclear station can be resynchronized to the wider grid. Both the Parr Combustion Turbines and Fairfield Pumped Storage Facility are used to provide dedicated, independent 115 KV and 230 KV service, respectively, to V.C. Summer Unit No. 1. Because they have alternative fuel on site in the form of fuel oil, these Parr combustion turbines are not energy limited and can support nuclear safety needs without other generating resources being available and without natural gas supply from pipelines for 72 hours or indefinitely so long as alternative fuel reserves are being replenished.

<u>THE NEED TO REPLACE THE CURRENT COMBUSTION TURBINES</u>

Q. WHY DOES DESC'S CURRENT COMBUSTION TURBINE CAPACITY NEED TO BE REPLACED?

A. Twelve of DESC's thirteen existing Combustion Turbine units were installed between 1969 and 1972. See Figure 1 below, which provides detail on the units that the Company proposed to retire and/or replace.

Unit	Summer Net MW	Winter Net MW	COD/Mfg	Model
Bushy Park 'A'*	20	26	1972	Westinghouse W251B
Bushy Park 'B'	20	26	1972	Westinghouse W251B
Coit CT1	13	18	1969	Westinghouse W251G
Coit CT2	13	18	1969	Westinghouse W251G
Hardeeville*,**	9	9	1968	Westinghouse W191G
Parr CT1*,***	13.5	17	1970	GE 5000M
Parr CT2***	13.5	17	1970	GE 5000M
Parr CT3***	16.5	19.5	1970	GE 5000N
Parr CT4***	16.5	19.5	1970	GE 5000N
Urquhart CT1	13	16	1969	Westinghouse W251G
Urquhart CT2	14	17	1969	Westinghouse W191G
Urquhart CT3	12	15	1969	Westinghouse W191G
Urquhart CT4	48	49	1999/1997****	GE LM6000 PC
Urquhart Unit 3 (NG Steam)	95	96	1955	N/A
Total Capacity Proposed to Retire/Replace	317	363		
Average Age of Proposed Units to Retire - ~51 Years (Capacity-Weighted Basis)				
* Bushy Park Unit 'A' is unavailable due to turbine vibration issues and is awaiting further disposition; Hardeeville unit is unavailable due to electrical switchgear failure; Parr CT1 is unavailable due to a generator failure				
** All simple cycle units are dual-fuel (natural gas and fuel oil) capable, except Hardeeville (fuel oil only)				
*** Parr CTs provide 115 KV offsite power to V.C. Summer Unit 1				
**** Urquhart CT4 was purchased as used equipment - manufactured in 1997				

Figure 1 – DESC Peaking Generation Replacement Plan

Units of this vintage were constructed largely in response to the Northeast Blackout of 1965. They lack modern operating and environmental controls and by today's standards they are inefficient in terms of fuel consumption. Many other utilities have long since retired these types of units and replaced them with more modern resources. Very few similar such units remain in service in the United States today.

As a result, these units are no longer supported by the original equipment manufacturers. Replacement parts, technical expertise, and craft labor trained to repair them is increasingly hard to find. Some parts can only be obtained by engaging specialty fabricators to forge or manufacture one-off replacements. Items such as compressor and turbine blades fall into this category and may require custom manufacturing at significant expense and without warranties. In addition, technicians that are qualified or willing to inspect, maintain and repair these units are also increasingly hard to find, as they are retiring from the workforce and the know-how they have provided is not being replaced.

Q. CAN DESC NOT EXTEND THE LIVES OF THESE UNITS BY REDUCING ITS RELIANCE ON THEM IN RECOGNITION OF THEIR AGE AND CONDITION?

A. No. The opposite is the case. Grid requirements are putting these outdated combustion turbines under increasingly challenging operational demands that they were not designed to support. It is important that they be replaced before more of them fail.

SPECIFIC IMPROVEMENTS AND BENEFITS FROM THE REPLACEMENT UNITS

Q. PLEASE DESCRIBE THE UNITS CHOSEN AS THE REPLACEMENT UNITS FOR THESE OUTDATED COMBUSTION TURBINES?

A. The units selected are three GE LM6000 PF+ units rated at 57 MW (winter) each for Bushy Park and Parr and two GE LMS100 PA+ units rated at 117 MW (winter) each for Urquhart. Of note, the GE LMS100 technology undergoes final assembly at GE's manufacturing facility in Greenville, South Carolina.

Q. WHY DID DESC NOT MATCH THE REPLACEMENT UNITS GENERATION OUTPUT PRECISELY TO THE OUTPUT OF THE UNITS BEING REPLACED?

A. Combustion turbine units come in discrete sizes. DESC has matched the replacement units to the units that they are replacing as well as is reasonably possible given the technology selected. An exact match could be obtained only by asking the supplier to artificially limit the capacity of the units to an amount that is less than their standard output. Customizing the units in that way would increase their cost while reducing their benefits to customers.

Q. IS DESC ASKING FOR COMMISSION APPROVAL OF THE SELECTION OR EXPENDITURE REFERENCED ABOVE?

A. No. This discussion is provided as background only. In this docket, DESC specifically requests the Commission to rule that it is not required to get any prior approval under the Siting Act or issue an RFP to construct these units, nothing more.

Q. ARE THE REPLACEMENT UNITS CONSISTENT WITH DESC'S NET ZERO CARBON AND METHANE REDUCTION COMMITMENTS?

A. Yes. The Replacement Units are compatible with DESC's environmental stewardship and sustainability values, including Dominion Energy's net-zero carbon and methane reduction commitments. Aeroderivative combustion turbines are complementary to renewable energy resources. Their exceptional flexibility is highly supportive of the continued integration of intermittent, non-dispatchable renewable energy sources, like photovoltaic solar and wind, without compromising system reliability.

Additionally, The Replacement Units can be fueled with a 30% hydrogen fuel mix today and the manufacturers have the combustion turbines on an engineering development roadmap to be capable of 100% hydrogen operation in the future.

Q. WHY IS HYDROGEN FUELING IMPORTANT?

A. Hydrogen does not emit greenhouse gases when burned and has the potential to be produced in quantities sufficient to fuel peaking generation across the electric industry. Hydrogen can be produced from renewable or non-emitting generation, or if generated from traditional fuels, can be coupled with carbon capture and storage. When available, such hydrogen resources will allow the Replacement Units to provide the system with dispatchable generation at even further reduced or zero carbon and methane emissions levels.

Q. WILL THE REPLACEMENT UNITS OTHERWISE REDUCE CARBON EMISSIONS IN THE NEAR TERM?

A. Yes. The Replacement Units are significantly more fuel efficient than the units they will replace. They can generate the same amount of electricity using 23% to 50% less fuel than the existing units. Reduced fuel consumption means reduced carbon emissions from day one of the Replacement Units' operation. In addition, because of their fuel efficiency, the Replacement Units are expected to begin displacing coal generation immediately in the Company's merit dispatch rankings. This will further reduce system carbon emissions. Modeling indicates that adding the new units will reduce 2025 carbon emissions by approximately 3.6% system-wide compared to continuing to operate the system with the current units. This is a significant reduction.

Q. WILL THE REPLACEMENT UNITS REDUCE FUEL COSTS TO CUSTOMERS COMPARED TO OTHER ALTERNATIVES, INCLUDING LEAVING THE CURRENT UNITS IN SERVICE?

A. Yes, the Company's expectation is that the Replacement Units will result in a more efficient system, resulting in lower fuel costs for customers than would be the case if DESC were to continue to operate the existing units.

DESC directly passes fuel costs through to customers each year in its annual fuel cost proceedings and any savings will almost immediately accrue to the customers' benefit.

Q. WILL THE REPLACEMENT UNITS OTHERWISE IMPACT THE COMPANY'S ENVIRONMENTAL FOOTPRINT?

A. Yes. The Replacement Units meet all federal and state standards for new sources and have the state-of-the-art air emissions controls built into their design. These units will be equipped with low NOx combustion systems, selective catalytic reduction systems for additional NOx control and oxidation catalysts for CO control which will significantly reduce criteria air emissions.

Q. ARE THE REPLACEMENT UNITS DESIGNED TO SUPPORT THE DEMANDS PLACED ON THE GRID BY SOLAR AND OTHER INTERMITTENT RENEWABLE GENERATION?

A. Yes. The Replacement Units are designed for multiple fast starts per day, which can be necessary to respond to solar intermittency. The Replacement Units are also designed for short minimum operating periods so that they come on and off line quickly to follow changes in solar generation and load efficiently. These units are well suited to providing the regulating reserves and intraday peaking capacity that the current electrical system needs as a result of the significant influx of renewable resources on the DESC system.

Q. WILL THE REPLACEMENT UNITS ASSIST WITH VOLTAGE SUPPORT?

A. Yes. The Bushy Park and Parr units will be equipped with synchronous condensing capability and will be able to generate or absorb reactive power while the combustion turbine is offline, thus greatly increasing the system's ability to regulate voltage.

SPECIFICS OF THE REPLACEMENT PLAN

Q. WHERE DOES THE COMPANY PLAN TO LOCATE THE FIVE REPLACEMENT UNITS?

A. The five Replacement Units will be placed at the Bushy Park site in Berkeley County which is adjacent to the Company's Arthur M. Williams Station just north of Charleston, the Parr site in Fairfield County which is directly adjacent to the V.C. Summer Station north of Columbia and at Urquhart Station in Aiken County near the Department of Energy's Savannah River Site west of Aiken. This placement will locate at least one replacement unit in each of the Company's three transmission service districts, the Southern District, the Northern District and the Western District to provide black start capability, voltage support, and fully dispatchable generation capacity to those areas. The location of the units at existing sites allows the Replacement Units to benefit from existing natural gas infrastructure, electric transmission infrastructure, site security, environmental monitoring functions and staffing which is already present on site.

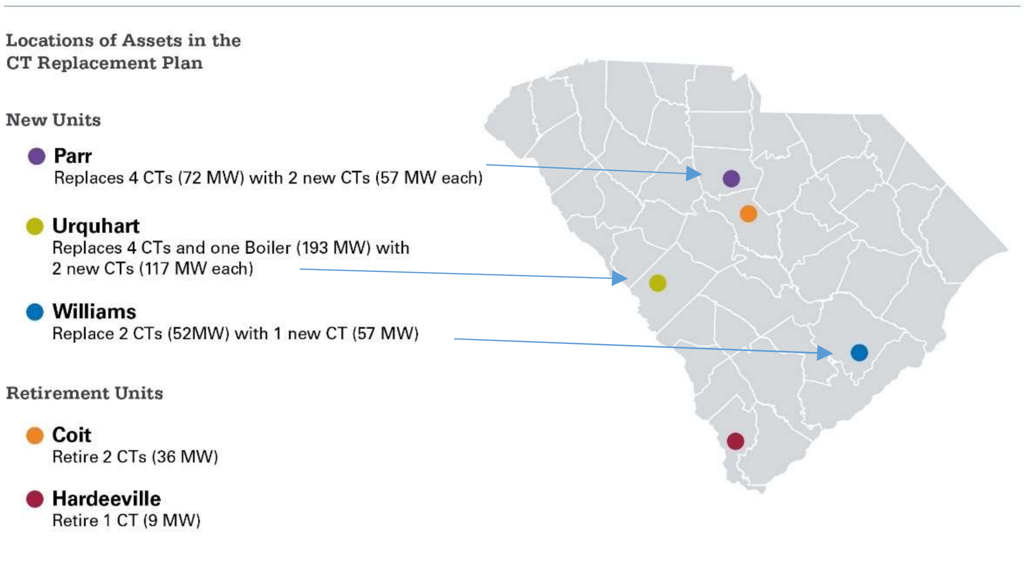

Figure 3 – Map of DESC Peaking Generation Replacement Plan

Q. WHAT UNITS ARE CURRENTLY IN USE AT THE BUSHY PARK SITE?

A. Currently, at its Bushy Park site, the Company operates two simple cycle combustion turbines (individually, "Bushy Park A" and "Bushy Park B"), which entered commercial operation in 1972. The two turbines can each run on either natural gas or fuel oil and, when operational, are each capable of providing 26 MW of capacity in the winter (52 MW combined) and 20

MW of capacity in the summer (40 MW combined). Bushy Park A suffered a catastrophic compressor section failure in October 2019 and has been in "mothball" status pending the replacement proposed herein.

Q. WHAT IS THE COMPANY'S PROPOSAL FOR THE BUSHY PARK SITE?

A. DESC proposes to replace the two existing combustion turbines at Bushy Park with a single combustion turbine with an expected winter output capability of approximately 57 MW. The efficiency (heat rate) of the replacement turbine would be significantly better than the existing turbines. The replacement turbine would require approximately 50% less fuel to generate the same amount of electricity and would also significantly reduce emissions. It will come equipped with selective catalytic reduction systems for NOx control and oxidation catalysts for CO control.

The proposed replacement Bushy Park generator would provide black start capacity for DESC's Southern Region and would also be equipped with synchronous condensing capability to support voltage regulation in the DESC Southern Region.

Q. WHEN DOES DESC ANTICIPATE THIS REPLACEMENT UNIT WILL BE READY FOR COMMERCIAL USE?

A. DESC is planning for the replacement Bushy Park unit to enter commercial operation in 2023.

Q. DOES THE BUSHY PARK REPLACEMENT MEET THE MAJOR UTILITY FACILITY THRESHOLD UNDER THE SITING ACT?

A. No. The proposed Bushy Park replacement unit is not "designed for, or capable of, operation at a capacity of more than seventy-five megawatts," and so the Company has determined that it is not a "major utility facility" as that term is defined in S.C. Code Ann. § 58-33-20 and has not requested siting approval or a like-facility determination from the Commission pursuant to S.C. Code Ann. § 58-33-110(1).

Q. WHAT COMBUSTION TURBINES ARE IN CURRENT OPERATION AT THE PARR FACILITY?

A. Currently, at Parr, the Company operates four simple cycle combustion turbines ("Parr CT #1", "Parr CT #2", "Parr CT #3", and "Parr CT #4"), which entered commercial operation in 1970 and can run on either natural gas or fuel oil. When operational, Parr CT #1 and CT #2 are each capable of providing 17 MW of capacity in the winter (34 MW combined) and 13.5 MW of capacity in the summer (27 MW combined), and Parr CT #3 and CT #4 are each capable of providing 19.5 MW of capacity in the winter (39 MW combined) and 16.5 MW of capacity in the summer (33 MW combined). These four turbines provide a secondary source of offsite power through their direct transmission connection to V.C. Summer Nuclear

Station. They play a critical role in supporting nuclear safety and online maintenance of the emergency diesel generator sets at Summer Station.

Q. WHAT DOES DESC PROPOSE FOR THE PARR FACILITY?

A. DESC proposes to replace the two sets of existing combustion turbines with two combustion turbines, each with an expected winter output capability of approximately 57 MW (114 MW combined).

Q. HOW WOULD THE REPLACEMENT UNITS IMPACT THE PARR FACILITY OPERATIONS?

A. The replacement turbines would have significantly better heat rates than the current units and would require approximately 35% less fuel to generate the same amount of electricity than Parr CT #1 and CT #2 and approximately 34% less fuel to generate the same amount of electricity than Parr CT #3 and CT #4. The replacement turbines would also significantly reduce emissions as compared to the existing turbines as DESC intends to implement selective catalytic reduction systems for NOx control and oxidation catalysts for CO control.

Additionally, the two proposed replacement Parr units would provide black start services to DESC's Northern Region (including serving as an offsite power source to V.C. Summer Nuclear Station) and would also be equipped with synchronous condensing capability for support voltage regulation in the DESC Northern Region.

Q. WHEN DOES THE COMPANY ANTICIPATE THESE UNITS WILL BE READY FOR COMMERCIAL OPERATIONS?

A. DESC is planning for the two replacement Parr units to enter commercial operation in late 2023 or 2024.

Q. DOES THE PARR REPLACEMENT MEET THE MAJOR UTILITY FACILITY THRESHOLD UNDER THE SITING ACT?

A. No. Because neither of the replacement Parr turbines are "designed for, or capable of, operation at a capacity of more than seventy-five megawatts," the Company has determined that neither turbine is a "major utility facility" as that term is defined in S.C. Code Ann. § 58-33-20 and so has not requested either siting approval or a like-facility determination from the Commission pursuant to S.C. Code Ann. § 58-33-110(1).

Q. PLEASE DETAIL THE CURRENT OPERATIONS AT THE URQUHART SITE

A. Currently, at its Urquhart site, the Company operates three combustion turbines ("Urquhart CT #1", "Urquhart CT #2" and "Urquhart CT #3"), all of which entered commercial operation in 1969; a combustion turbine ("Urquhart CT #4"), which was installed in 1999; and a natural gas boiler supplying steam to a turbine-generator set ("Urquhart Steam Unit #3"), which entered commercial operation in 1955. This is in addition to the existing repowered combined-cycle units (Urquhart ST #1, ST #2, CT #5, and CT #6), which are not subject to the Company's request.

Urquhart CT #3 was acquired from Duke Power Company in 1994, but it was constructed and operated alongside Urquhart Combustion Turbines #1 and #2. *See,* Order 1994-1242. Urquhart CT #4 was installed in 1999 to meet growing generation peaking needs; this unit was purchased as used equipment; it was originally constructed in 1997.

The four combustion turbines can each run on natural gas or fuel oil; the steam turbine was converted from primary operation on coal to operation solely utilizing natural gas in 2012. When operational, Urquhart CT #1 is capable of providing 16 MW of winter capacity and 13 MW of summer capacity; Urquhart CT #2 is capable of providing 17 MW of winter capacity and 14 MW of summer capacity; Urquhart CT #3 is capable of providing 15 MW of winter capacity and 12 MW of summer capacity; Urquhart CT #4 capable of providing 49 MW of winter capacity and 48 MW of summer capacity; and the Urquhart Steam Unit #3 is capable of providing 96 MW of winter capacity and 95 MW of summer capacity.

Q. WHAT DOES DESC PROPOSE FOR THE URQUHART SITE?

A. DESC proposes to replace the four existing combustion turbines with a single combustion turbine with an expected winter output capability of approximately 117 MW and to also replace Urquhart Steam Unit #3 with a single combustion turbine with an expected winter output capability of approximately 117 MW. The GE LMS100 combustion turbine technology selected for the Urquhart site is currently the most efficient simple cycle combustion turbine technology available in the marketplace. The replacement turbine for the four combustion turbines would require approximately 45% less fuel to generate the same amount of electricity and the replacement turbine for the Urquhart Steam Unit #3 would require approximately 23% less fuel to generate the same amount of electricity. The replacement turbines would also significantly reduce emissions as compared to the existing units as DESC intends to implement selective catalytic reduction systems for NOx control and oxidation catalysts for CO control. The two proposed replacement Urquhart units would also provide black start and voltage control services to DESC's Western Region.

Q. WHEN WOULD THE URQUHART UNITS BE READY FOR COMMERCIAL OPERATION?

A. DESC is planning for the replacement Urquhart units to enter commercial operation in 2024 or 2025.

Q. DOES THE URQUHART REPLACEMENT MEET THE MAJOR UTILITY FACILITY THRESHOLD UNDER THE SITING ACT?

A. Yes. Both of the replacement Urquhart turbines are "designed for, or capable of, operation at a capacity of more than seventy-five megawatts," and are each a "major utility facility" as that term is defined in S.C. Code Ann. § 58-33-20. However, the Company has determined that each replacement combustion turbine is a "like facility" for the gas fired generation capacity it is replacing. Therefore, the Company respectfully requests that the Commission make a determination, as authorized by S.C. Code Ann. § 58-33-110(1) (2015), that each Urquhart replacement unit constitutes "the replacement of an existing facility [or facilities] with a like facility" and therefore does not constitute "construction of a major utility facility" for which a Certificate is required.

Q. WHY IS THE COMPANY PLANNING TO NOT REPLACE THREE OF THE THIRTEEN COMBUSTION TURBINES IT IS RETIRING AT HARDEEVILLE AND COIT?

A. For efficiency sake, and to reduce cost, the Company does not plan to replace the three relatively small units located at Hardeeville, in Jasper County and Coit, which is located in the Olympia Neighborhood in downtown Columbia. If the plan is approved, the Company plans to retire and decommission the 9 MW Hardeeville combustion turbine, which entered commercial operation in 1968, and the two Coit combustion turbines, which entered commercial operation in 1969. Each of the Coit units are capable of providing 18 MW of winter capacity (36 MW combined) and 13 MW of summer capacity (26 MW combined). The Hardeeville turbine suffered a catastrophic electrical switchgear failure in 2018 and has been unavailable since that time. The Hardeeville unit can also only operate on fuel oil; there is no natural gas service to that generating site. These retirements would help to further reduce the Company's operational and environmental footprint without impacting reliability.

CONCLUSION

Q. WHAT ARE YOU REQUESTING THE COMMISSION TO DO?

A. I request that the Commission approve the Company's request for a waiver from the Commission Order No. 2007-626 and Order No. 2018-804 RFP requirements for the proposed replacement units at Bushy Park, Parr, and Urquhart Stations and to provide like-facilities designations, as applicable, for the replacements at Urquhart.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

Before the Public Service Commission of South Carolina

Docket No. 2021-93-E

Verification of Prefiled Direct Testimony of Andrew R. Walker

The undersigned, being first duly sworn, deposes and says that the information contained in this prefiled direct testimony is true and accurate to the best of my knowledge, information and belief.

This the 18th day of October, 2021.

Andrew Walker

Andrew R. Walker

Sworn to before me this

18th day of October, 2021.

Katrina McRant-Thompson

Notary Public for the State of South Carolina

My Commission Expires: March 12, 2024.

KATRINA McRANT - THOMPSON
NOTARY
PUBLIC
Exp. March 12, 2024
SOUTH CAROLINA